Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-56 (previously canceled)

Claim 57 (previously presented): A method for detection and location of a target crossing into an area defined by a sensor cable, comprising:

generating a TX signal and transmitting same over a first transmission line of the sensor cable, for creating an electromagnetic field;

detecting an RX signal induced in a second transmission line of the cable by the electromagnetic field and identifying in the RX signal a contra-directional reflection received from a target and a co-directional reflection received from the far-end (F) of the first transmission line; and

processing the contra-directional reflection for providing a first coordinate (R) of the target, and processing the co-directional reflection for providing a second coordinate (Z) of the target.

Claim 58 (previously presented): The method as claimed in claim 57, wherein the TX signal is comprised of successive coded pulse sequences selected to achieve a thumbtack correlation in the RX signal at a plurality B of points along the sensor cable, defined as range bins.

Claim 59 (previously presented): The method as claimed in claim 57, wherein the TX signal is a coded pulse sequence comprising a phase coded pulse of m chips, a first p-chip long logic "0", a complement of the phase-coded pulse, and a second p-chip long logic "0" modulated over a carrier signal of frequency fc in the HF/VHF transmission band, a chip having a duration of n synchronous cycles of the fc.

Claim 60 (previously presented): The method as claimed in claim 59, wherein the step of detecting comprises digitizing the RX signal at twice the chip rate for the duration $M=2(m+p)$ of one coded pulse sequence.

Claim 61 (previously presented): The method as claimed in claim 58, wherein the second coordinate Z is obtained from a target location signal detected in a range bin at the far-end (F), to provide a measure of the co-directional reflection.

Claim 62 (previously presented): The method as claimed in claim 58, wherein the first coordinate R is derived from a target location signal detected in all range bins along the sensor cable, to provide a measure of the contra-directional reflection.

Claim 63 (previously presented): The method as claimed in claim 59, wherein the sample rate is half the pulse width to ensure that a target location signal is detected in three consecutive range bins.

Claim 64 (previously presented): The method as claimed in claim 59, wherein the step of processing comprises:

detecting a target location signal in three consecutive range bins;

linearly interpolating the amplitude of the target location signal over the three range bins for identifying the general location of the target within the range bin;

within the target bin, determining a group of target sub-bins based on the phase difference $\Delta\Phi$ of the target location signal with respect to the TX signal; and

within the group of target sub-bins, determining a target sub-bin based on the relative phase angle $\Delta\Phi$.

Claim 65 (previously presented): The method as claimed in claim 64, further comprising providing a threshold for each range sub-bin and calibrating the thresholds to distinguish a target's presence from environmental changes on the surface of the sensor cable.

Claim 66 (previously presented): The method as claimed in claim 57, wherein the step of processing the co-directional reflection comprises determining an end range bin where the co-

directional reflection is generated in the absence of a target and measuring a reference co-directional clutter generated in the end range bin.

Claim 67 (previously presented): The method as claimed in claim 66, wherein the step of processing the co-directional reflection further comprises measuring a target co-directional clutter generated in the end range bin; and comparing the target co-directional clutter with the reference co-directional clutter for determining the second coordinate Z of the target.

Claim 68 (previously presented): An intrusion detection sensor comprising:

means for generating a TX signal and transmitting same over a first open transmission line, for creating an electromagnetic field;

means for converting an RX signal induced in a second open transmission line by the electromagnetic field into an in-phase (I) component and a quadrature-phase (Q) component for each of a plurality B of range bins corresponding to a respective linear distance R;

means for processing the I and the Q components for each range bin for detecting a target and specifying coordinates R and Z of the target,

wherein R is a linear distance along the first transmission line and Z is a radial distance from the first transmission line.

Claim 69 (previously presented): The sensor as claimed in claim 68, wherein the means for generating comprises:

a TX code generator for generating a coded pulse sequence comprising a phase-coded pulse of m chips, a first p-chip long logic "0", a complement of the phase-coded pulse, and a second p-chip long logic "0";

a pseudo-noise generator for mixing the coded pulse sequence with a pseudo-noise signal for uniformly spreading the spectrum of the coded pulse sequence; and

means for modulating the coded pulse sequence over the carrier signal to obtain the TX signal.

Claim 70 (previously presented): The sensor as claimed in claim 69, wherein the means for converting comprises:

means for synchronously detecting an in-phase (I) sample and a quadrature-phase (Q) sample of the RX signal;

a RX code generator for generating a synchronous version of the coded pulse sequence, with a chip rate twice the chip rate of the TX signal;

means for accumulating B consecutive I samples and Q samples, while demodulating the pseudo-noise code from each sample and for simultaneously correlating the version of the coded pulse sequence with each of the I and Q samples, respectively, for creating the I component and Q component, wherein each the I and Q sample is time stamped to specify a range bin.

Claim 71 (previously presented): The sensor as claimed in claim 70, wherein the means for synchronously detecting comprises:

a first and a second mixer for combining the carrier signal and a quadrature version of the carrier signal with the RX signal and providing an in-phase and a quadrature-phase demodulated version of the RX signal, respectively; and

a first and a second analog to digital converter for sampling the in-phase and the quadrature-phase demodulated version of the RX signal, respectively for obtaining the I sample and the Q sample.

Claim 72 (previously presented): The sensor as claimed in claim 68, wherein the means for processing comprises:

means for filtering the I component and the Q component for obtaining a clutter in-phase term I C and a clutter quadrature-phase term QC, respectively;

means for subtracting the IC term and the QC term from the I component and the Q component respectively for obtaining an in phase incremental variation in magnitude (δIT) and a quadrature-phase incremental variation in magnitude (δQT) introduced by a target response in the RX signal;

first calculating means for receiving the IC and QC terms and the incremental variations δIT and δQT and calculating a X response in phase with a co-directional clutter and a Y response

in quadrature with the co-direction at clutter for a range bin where the co-directional clutter is generated; and

second calculating means for receiving the X and Y responses and the incremental variations δIT and δQT and calculating a target location signal for all range bins where the contra-directional clutter is generated.

Claim 73 (previously presented): The sensor as claimed in claim 72, wherein the means for processing further comprises target location means for detecting a local peak in the target signal, and generating a target sub-bin signal identifying a target bin and a target sub-bin associated with the local peak.

Claim 74 (previously presented): The sensor as claimed in claim 73, wherein the means for processing further comprises detection means for specifying the coordinates R and Z of the target whenever the target sub-bin signals exceeds a threshold corresponding to the target sub-bin.

Claim 75 (previously presented): The sensor as claimed in claim 73, wherein the means for processing further comprises calibration means for determining a threshold for each range sub-bin.

Claim 76 (canceled without prejudice)

Claim 77 (canceled without prejudice)

Claim 78 (canceled without prejudice)

Claim 79 (canceled without prejudice)

Claim 80 (canceled without prejudice)

Claim 81 (canceled without prejudice)

Claim 82 (canceled without prejudice)

Claim 83 (canceled without prejudice)

Claim 84 (canceled without prejudice)

Claim 85 (canceled without prejudice)

Claim 86 (canceled without prejudice)

Claim 87 (canceled without prejudice)

Claim 88 (canceled without prejudice)

Claim 89 (canceled without prejudice)

Claim 90 (canceled without prejudice)

Claim 91 (currently amended): A method for detection and location of a target crossing into an area defined by a sensor cable, comprising:

generating a TX signal and transmitting same over a transmission line of the sensor cable, for creating an electromagnetic field;

receiving a coupled signal in the transmission line and separating an RX signal from the coupled signal in the transmission ~~fine~~ line caused by the target disturbing the electromagnetic field;

detecting the RX signal and identifying in the RX signal a contradirectional reflection received from the location of the target; and

processing the contra-directional reflection for providing a range of the target.

Claim 92 (previously presented): The method as claimed in claim 91, wherein said TX signal is a coded pulse sequence comprising a phase coded pulse of m chips, a first p-chip long logic "0", a complement of said phase-coded pulse, and a second p-chip long logic "0" modulated over a carrier signal of frequency fc in the HF/VHF transmission band, a chip having a duration of n synchronous cycles of said fc.

Claim 93 (previously presented): The method as claimed in claim 92, wherein the step of detecting comprises digitizing said RX signal at twice the chip rate for the duration M=2(m+p) of one coded pulse.

Claim 94 (canceled without prejudice)

Claim 95 (canceled without prejudice)

Claim 96 (canceled without prejudice)

Claim 97 (canceled without prejudice)

Claim 98 (previously presented): A method for detection and location of a target crossing into an area defined by a sensor cable, comprising:

generating a first TX signal and transmitting the first TX signal over a first transmission line of the sensor cable and simultaneously generating a second TX signal and transmitting the second TX signal over a second transmission line of the sensor cable, for creating an electromagnetic field;

receiving a first coupled signal corresponding to the first TX signal in the first transmission line and separating a first RX signal from the first coupled signal in the first transmission line caused by the target disturbing the electromagnetic field, and simultaneously receiving a second coupled signal corresponding to the second TX signal in the second transmission line and separating a second RX signal from the second coupled signal in the second transmission line caused by the target disturbing the electromagnetic field;

detecting the first RX signal and identifying in the first RX signal a first contra-directional reflection received from the location of the target, and simultaneously detecting the second RX signal and identifying in the second RX signal a second contra-directional reflection received from the location of the target;

correlating the first and the second contra-directional reflection; and

processing the correlated first and second contra-directional reflection to provide a range of the target.

Claim 99 (previously presented): The method as claimed in claim 98, wherein the first TX signal is a coded pulse sequence comprising a phase coded pulse of m chips, a first p-chip long logic "0", a complement of the phase-coded pulse, and a second p-chip long logic "0" modulated over a carrier signal of frequency fc in the HF/VHF transmission band, a chip having a duration of n synchronous cycles of the fc; and

wherein the second TX signal is a coded pulse sequence comprising a phase coded pulse of m chips, a first p-chip long logic "0", a complement of the phase-coded pulse, and a second p-chip long logic "0" modulated over a carrier signal of frequency fc in the HF/VHF transmission band, a chip having a duration of n synchronous cycles of the fc.

Claim 100 (previously presented): The method as claimed in claim 99, wherein the step of detecting the first RX signal comprises digitizing the first RX signal at twice the chip rate for the duration $M=2(m+p)$ of one coded pulse sequence, and wherein the step of detecting the second RX signal comprises digitizing the second RX signal at twice the chip rate for the duration $M=2(m+p)$ of one coded pulse sequence.

Claim 101 (canceled without prejudice)

Claim 102 (canceled without prejudice)

Claim 103 (canceled without prejudice)

Claim 104 (canceled without prejudice)

Claim 105 (canceled without prejudice)

Claim 106 (canceled without prejudice)